Listing and Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (currently amended) A method of generating a normalized bitmap representation of the shape of a visual object in an image comprising the steps of:

segmenting the image to generate a segmentation map of visual objects;

identifying samples from the segmentation map belonging to a visual object of interest;

identifying the largest connected blob to form an un-normalized bitmap; and

normalizing the un-normalized bitmap to form a normalized bitmap representation, wherein said normalizing step additionally comprises the steps of:

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estimating a mean and covariance for each valid sample in the un-normalized bitmap;

computing a principal direction for the un-normalized bitmap based upon the mean and covariance as eigenvectors of a covariance matrix; and

back projecting the un-normalized bitmap as a function of the mean and eigenvectors to normalize the un-normalized bitmap for translation, rotation and scale so that after normalization the normalized bitmap representation has a standard height and is oriented such that the principal direction is along a vertical direction.

2. (original) The method as recited in claim 1 further comprising the step of searching a database of images, each image having associated visual objects with normalized bitmap representations, in response to a query specifying a desired normalized bitmap representation to identify a plurality of visual objects having normalized bitmap representations that closely match the desired normalized bitmap representation.

3. (cancelled)

4. (original) The method as recited in claim 2 wherein the searching step comprises the steps of:

providing a query bitmap seeking similarly shaped visual objects from the database;

normalizing the query bitmap;

obtaining various mirror versions of the normalized query bitmap;

for each normalized bitmap representation in the database compute a mismatch value with the normalized query bitmap; and

identifying the visual objects having normalized bitmap representations with low mismatch values.

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5. (original) The method as recited in claim 2 wherein the searching step comprises the steps of:

providing a query bitmap to find visual object in the database having a similar aspect ratio;

normalizing the query bitmap;

computing a query aspect ratio for the normalized query bitmap;

computing an aspect ratio for each normalized bitmap representation in the database;

obtaining an absolute difference between the aspect ratios for each normalized bitmap representation and the query aspect ratio; and

identifying the visual objects where the absolute difference has low values.

6. (original) The method as recited in claim 2 wherein the searching step comprises the steps of:

providing a query bitmap to find visual objects with a similar density of valid samples;

computing a query density of valid samples for the query bitmap;

computing a density for each normalized bitmap representation in the database;

obtaining an absolute difference between the density for each normalized bitmap representation and the query density; and

identifying the visual objects where the absolute difference is low.

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7. (cancelled)

8. (cancelled)

9. (new) A method of generating a normalized bitmap representation of the shape of a visual object in an image comprising the steps of:

segmenting the image to generate a segmentation map of visual objects;

identifying samples from the segmentation map belonging to a visual object of interest;

identifying the largest connected blob to form an un-normalized bitmap; and

normalizing the un-normalized bitmap to form a normalized bitmap representation, wherein said normalizing step comprises a normalization operation that is at least one of: adjusting a translational parameter corresponding to the un-normalized bitmap and adjusting a rotational parameter corresponding to the un-normalized bitmap, where the result of said normalization operations enables the normalized image to be compared to other normalized images.

10 (new) The method of claim 9, wherein said normalizing step preserves the aspect ratio of the un-normalized bitmap.

11. (new) The method as recited in claim 9 further comprising the step of searching a database of images, each image having associated visual objects with normalized bitmap representations, in response to a query specifying a desired normalized bitmap representation to identify a plurality of visual objects having normalized bitmap representations that closely match the desired normalized bitmap representation.

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12 . (new) The method as recited in claim 9 wherein the searching step comprises the steps of:

providing a query bitmap seeking similarly shaped visual objects from the database;

normalizing the query bitmap;

obtaining various mirror versions of the normalized query bitmap;

for each normalized bitmap representation in the database compute a mismatch value with the normalized query bitmap; and

identifying the visual objects having normalized bitmap representations with low mismatch values.

13. (new) The method as recited in claim 9 wherein the searching step comprises the steps of:

providing a query bitmap to find visual object in the database having a similar aspect ratio;

normalizing the query bitmap;

computing a query aspect ratio for the normalized query bitmap;

computing an aspect ratio for each normalized bitmap representation in the database;

obtaining an absolute difference between the aspect ratios for each normalized bitmap representation and the query aspect ratio; and

identifying the visual objects where the absolute difference has low values.

14. (new) The method as recited in claim 9 wherein the searching step comprises the steps of:

providing a query bitmap to find visual objects with a similar density of valid samples;

computing a query density of valid samples for the query bitmap;

computing a density for each normalized bitmap representation in the database;

obtaining an absolute difference between the density for each normalized bitmap representation and the query density; and

identifying the visual objects where the absolute difference is low.